Telework and Spatial Trends in Australian Cities:

A Critical Review

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Abstract: Information and Communication Technology (ICT) has introduced the possibility for change in urban spatial structure. The new applications of ICT for citizens include electronic services which can have separate impacts on such change. However, according to current literature one of the most influential forces for this transformation is the ability to telework. During recent decades, urban spatial change has come with the emergence of different types of "teleworking environments". These teleworking environments vary regarding the different life/work opportunities and psycho-social situations which provide for teleworkers. This calls for better understanding of the functional roles each teleworking environment can have in the urban context, which is a gap in teleworking literature. Accordingly, the present paper aims to highlight the need for differentiating between teleworking environments in Australian urban planning. In order to do so, the paper begins with a review of the concept of teleworking and current international trends. It overviews the typology of teleworking environments, and introduces existing experiences in Australia. The paper then explains the psycho-social differences between teleworking environments and concludes with a call for deeper understanding and consideration of psychological frameworks.

1-INTRODUCTION

For the first time, in the1950s, an idea was raised that the combination of telecommunication technology and computing technology could lead to change in the locus of work (Jones, 1957). During the 1970s some scholars started to explore the idea of telework as a new way of working and commuting to work (Nilles, 1976). This idea emerged as a solution in response to the oil crises of the 1970s. Thereafter a number of other reasons such as major emergencies and the advent of new technologies made the idea of teleworking popular (DBCDE, 2011).

Although the concept of telework appears clear at first glance, there is an ambiguity in the literature regarding the definition of this concept, and in fact there is no accepted definition. Various terms such as Telework/Telecommuting/E-working/Remote working/Distant working /Flexible working/Electronic cottages have been created and equally used by scholars for naming the concept. The variety in terminology of teleworking indicates the tendency of theorists to emphasize different dimensions of the concept. According to the Department of Broadband, Communications and the Digital Economy (2011), most definitions generally mention the role of information and communications technology (ICT) to undertake remote work. However, different perceptions and ideas about characteristics like regularity of work, location of work, and formality in work, differentiate between various definitions of telework. According to some studies, achieving a mutually acceptable definition of telework is largely impossible for researchers because of complexity in the changing nature of telework as a socio-technological phenomena (Mokhtarian et al., 2005). One main reason why definitions are different could be this fact that different teleworking strategies indeed represent different work environments that are implicitly identified with distinct and specific work climates. Accordingly, the paper's main objective is to review the state of current research into telework, with particular reference to Australia and to the need for more research into psycho-social influences on the type and frequency of telework.

2-INTERNATIONAL RATES OF TELEWORK

The latest statistics show that the general rate of telework adoption by people has been increasing globally during recent decades (DBCDE, 2011), although the general trend has experienced ups and downs in different countries. However, the latest statistics overall show that in regions like the US, Europe and Canada; more than 10% of the workforce frequently undertakes telework (U.S.DepartmentOfCommerce, 2002, Fortier, 2010, Haddon and Brynin, 2005, Alizadeh, 2013). The US has one of the highest rates of telework adoption in the world. Different surveys and reports indicate different rates, which altogether show an increasing trend of teleworking adoption in the US. According to World at Work (2011) around 16 million US employees work from home at least one day per month which is about 10 per cent of all employees. About 8.4 per cent of the total workforce have reported that they telework at least one day per week, and 4.5 per cent have reported that they telework 'almost every day' (DBCDE, 2011).

3-TELEWORKING ENVIRONMENTS: TYPOLOGY

Teleworking environments are the physical environments in which teleworking takes place. Regarding the spatial characteristics of teleworking environment, the simultaneous experience of life and work can be different. The environments in which telework can take place mostly frame the working strategy each teleworker can adopt. The literature on telework includes different innovative ideas about spatially implementing telework. These innovative telework environments have been suggested by different sources including scholars, authorities and professionals. Different studies have classified and provide a typology for teleworking environments based on different factors. Some of them are more comprehensive as they put more emphasis on the concept of work flexibility and not necessarily the environment telework takes place in, although it is accepted that every form of telework essentially should be defined in the context of a specific environment.

From the beginning, the idea of telework has been suggested in two forms: working from home and working from a regional office close to home: a regional telework centre (Nilles and Alexander, 1974, Nilles, 1988, Mokhtarian, 1991, Nilles, 1991). Although home based form of telework has been a common form of telework during past 3 decades, telework has been generally considered to include other new forms of non-traditional work environments. Fritz et al. (1995) have reviewed and categorized different studies regarding the typology and the methodology of telework. In their study, they have provided taxonomy of telework according to three different structures: 1) Telework spatial structure 2) Telework coordination structure 3) Telework temporal structure. Based on the spatial structure perspective, they make a distinction between two groups of traditional and non-traditional telework locations. They have identified Traditional satellite office, Distributed work groups, Mobile work and Inter-organizational systems under traditional groups, and Non-traditional satellite offices, Neighbourhood work centres, Telecottages and Telecommuting under the Non-traditional group. They subsequently mention three other types of telework while addressing the temporal perspective: Resort offices, Flexitime, and Supplemental work at home(Fritz et al., 1995).

Although the Fritz et al. (1995) study seems to be comprehensive, including all types of telework and teleworking environments, recent literature prefers more general classifications. For example, the Australia Telework Advisory Committee (2006) which considers the concept of teleworkers rather than telework, just recognizes four groups of teleworkers (ATAC, 2006): Home-based employed teleworkers; Home-based self-employed teleworkers; Mobile teleworkers; and Day extenders. Here the focus of definitions returns to the nature of work. However some references put stress on the environment of telework instead. Georgetown Law (2010) introduces four approaches to telework (DBCDE, 2011): A) Hot desking which is a type of telework where the employee works from a remote location part or most of the time, and from the main office the rest of the time. B) Hoteling which is similar to "hot desking", but employees must reserve a space ahead of time. C) Telework centers which are facilities that provide workstations and other office facilities that employees from several organisations can use. D) Collaborative offices that are virtual work environments in which employees can work cooperatively from different locations using a computer network.

It is noteworthy that identified teleworking environments can also be different regarding characteristics like architectural form and functional roles. Exemplifying the matter of architectural form, Alizadeh (2012) in a study on American and Australian live/work communities has recognized three different types of home-based offices (Integrated, Semi-separated, and Completely separated) and two different types of community-based offices (Co-workplace and Office buildings). Additionally, telework

centers can play different functional roles. For example, regional telework centers, and neighborhood telework centers are apparently similar in work environment, while playing different functional roles.

4- TELEWORKING ENVIRONMENTS; PSYCHO-SOCIAL DIFFERENCES

The adoption of telework by teleworkers or organizations can come with advantages and disadvantages (Kurland and Bailey, 2000, Hamilton, 2002, Sikes et al., 2011, Baruch, 2000, Harpaz, 2002, Baruch, 2001, Mello, 2007, Green et al., 2010, DBCDE, 2011). Research has analysed these advantages/disadvantages (benefits/challenges) from different perspectives: individuals (employees, managers, etc.), employers (companies and organizations), community, government, and the environment (natural and built environment). The current literature on telework presumes some benefits and challenges of telework are quite evident. The literature frequently mentions benefits such as less commuting time, lower expenses (commuting for employees, office costs for employers), locational independence, helping some specific social groups (mothers with children, people with disabilities, etc.), as well as challenges like unsuitability for all types of job, the high price of suitable technology, lack of technical assistance, etc. However, there are a number of problematic issues which are still at a hypothetical level and have been debated by literature. Different studies have explained the reasons why these contradictory findings have been found (Shin et al., 2000; Bailey and Kurland, 2002(Shin et al., 2000, Bailey and Kurland, 2002, McCloskey and Igbaria, 1998, Crandall and Gao, 2005, Baruch, 2001). Indeed, the literature generally is not sure whether these issues should be considered as positive or negative sides of teleworking. These problematic issues mostly include managerial, psychological and social aspects of teleworking. The challenges include whether telework can improve the work environment; increase productivity; lead to more autonomy; provide greater lifestyle flexibility; reduce stress; raise work satisfaction and motivation, etc.

Intrinsic differences of working in different teleworking environments are one of the reasons why research about psychological and social impacts of teleworking results in contradictory findings. Kurland and Bailey (2000) classify hypothetical advantages and challenges of teleworking in different teleworking environments for three levels: organizational, individual and societal. They assume differences between four different teleworking strategies/environments (home-based telecommuting, satellite office, neighbourhood work centres, and mobile work) in regard to possible advantages and challenges. Morganson et al. (2010) analyse these fundamental differences under three psycho-social concerns: a) Work-life balance; b) Job satisfaction; and c) Workplace inclusion. According to them, research about impacts of teleworking on work-life balance may show different results for different teleworking environments. Working at home is often seen as a facilitating working strategy which helps to balance the relationship between work and life (Shockley and Allen, 2007, Sparrow, 2000). However working in other teleworking environments such as satellite offices and telework centres may not similarly support work and life balance as there is not enough integration of work and life compared with home based telework.

In regard to job satisfaction, Morganson et al. (2010) argue that job satisfaction for home-based teleworkers can be affected by the isolating impact of teleworking. Indeed, according to some studies lack of face-to-face relationships between teleworkers and their colleagues in the main office increases social isolation and likely raises depression (Campione, 2008). However, Morganson et al. (2010) mention that there can be other likely results for job satisfaction in other teleworking environments. In fact, compared with home-based teleworking, in collective teleworking environments (such as teleworking centres or satellite offices) teleworkers have better opportunities to manage and control interference between working and living. However they may feel less job satisfaction compared with main office workers. Because they are less connected to the main office and their organizational situations, they may come under less organizational consideration which presumably leads to less job satisfaction.

This leads to specific consideration of workplace inclusion, the third issue identified by Morganson et al. (2010). In the telework literature, workplace inclusion is understood as a sense of attachment to the organization. It is defined as "the degree to which an employee is accepted and treated as an insider by others in a work system" (Hope Pelled et al., 1999) and "the extent to which diverse individuals are allowed to participate and are enabled to contribute fully" (Miller, 1998). According to Morganson et al. (2010), since telework changes the place, location and time of working, it naturally can decrease communication between employees, their managers and their colleagues (Hinds and Bailey, 2003, Dambrin, 2004). Telework can come with the feeling of not being recognized as a real organizational member (feelings of 'being out of the loop') and the fear of losing formal and informal opportunities,

because teleworkers cannot realize their working situation in the organizational context, and be sure about getting their membership rights (Lombard and Ditton, 1997, Bartel et al., 2007, Gajendran and Harrison, 2007). Professional isolation, which can be considered as an adjunct to work exclusion, may also come with negative outcomes such as increasing social isolation (Montreuil and Lippel, 2003), and reducing job performance (Golden et al., 2008). It is understandable that these negative outcomes increase more when face-to-face interactions decrease. Since every teleworking environment has its own social interaction considerations, each is therefore different in terms of providing job satisfaction and productivity for teleworkers. Morganson et al. (2010) argue that it can be understandable that these negative effects of outcomes increase more when the face-to-face interactions decrease. Since every teleworking environment has its own social interaction considerations, each teleworking environment is therefore different in terms of providing job satisfaction and productivity for teleworkers.

5-TELEWORKING IN AUSTRALIA: PRACTICE AND PLANNING POLICY

National surveys conducted during the last decade indicate there is considerable potential interest in Australian society for the adoption telework. The Australian Bureau of Statistics (ABS, 2008) survey which covered 3900 households, showed that just six per cent of the total Australian workforce were involved in telework in 2006 (DBCDE, 2011). ABS just considers home-based telework; however it includes all types of work arrangements including full-time to occasional arrangements. The Household, Income and Labour Dynamics in Australia (HILDA) survey is another survey which includes a series of annual data and gives a more up to date picture of the situation of telework in Australia. According to the HILDA data which covers 7000 households for every year of the survey, the overall rate of telework adoption for employees, regardless of having a formal arrangement, is 18 per cent of all surveyed Australian employees undertaking some work from home in 2009(DBCDE, 2011). According to the Department of Broadband, Communications and the Digital Economy (DBCDE, 2011) this rate shows an interest in adoption of telework on an informal basis. Another pivotal point is the matter of frequency in telework. HILDA data indicates that around 60 per cent of all Australian teleworkers undertake work from home for eight or fewer hours per week (equivalent to approximately one working day per week), whereas less than 10 per cent work from home 33 or more hours per week (indicating more than four days per week or, effectively, at or near full-time telework). The Department of Broadband, Communications and the Digital Economy (DBCDE, 2011) argues that "since the benefits of telework can be understood on a regular base, this rate probably means the benefits are not being fully realised". Regarding businesses, the 2006 national survey of the Australian Telework Advisory Committee (ATAC, 2006), which was conducted by Sensis among Australian small to medium-sized businesses, suggests that 34% of Australian companies have been involved in teleworking. Furthermore the later survey in 2009 (Sensis, 2009) indicates that 24% of organizations had employees that had adopted different teleworking arrangements (Alizadeh, 2013).

Although telework has mostly have been realized in home-based environments in Australia, recently a number of collective forms of teleworking environments have also emerged. These collective telewoking environments are different in purpose, size, geographical location, sphere of influence and type of ownership (public or private sector). These environments can act as small businesses or be under the ownership of large organizations.

The Australian Telework Advisory Committee (2005) has reviewed and reported a number of case studies of collective teleworking (ATAC, 2005). It has identified the Satellite Centre of the NSW Government's Roads and Transport Authority, the Lateral Sands time-shifting approach, the Modular Interactive Telecommunications Environment project with a rural satellite centre, and the Collaborative Training and Education Centre involving virtual working, as collective teleworking practices

During recent years, many state governments and city councils in Australia have started to consider innovative strategies for developing different types of collective teleworking environments. For example an ACT Assembly Committee is currently "looking at ways the ACT government and neighbouring councils can work more closely together" (Jean, 2013). This is based on residents' potential interest in working from smart work centres in commuter towns under a proposal being floated by regional councils (Jean, 2013). In Western Australia, a digital strategy has recently launched by the City of Joondalup in northern Perth. This strategy proposes establishing a telework center (smart work center) as a part of a digital city hub (JoondalupCityCouncil, 2013).

The NSW Central Coast has long been a major out-commuting region, and has had a telework centre since the late 1990s. The West Gosford telework centre was created by the Roads and Traffic

Authority in 1998 as a six month trial in order to assess the financial benefits of telework (RMS, 2010). West Gosford was selected as the best place for servicing Roads and Maritime Services staff who lived in the Central Coast and commuted to Sydney or Newcastle to work. The successful experience of the West Gosford office proved that a teleworking center can be a cost-effective alternative to home-based work (RMS, 2010). Based on this experience, a Penrith telework center was established covering the large number of Roads and Traffic Authority staff who lived in greater western Sydney. Central Coast residents who commute to Sydney can also take advantage of another telework centre at Wyong. In addition, the Henry Kendall Group has recently announced that it will create the Nexus Hub centre in North Wyong to support collaboration and innovation for small business operators, entrepreneurs and teleworkers. This hub will utilize the existing infrastructure of the Group's Infraserve data centre, and it provides internet connectivity at the rate proposed by the National Broadband Network to make possible high quality multimedia communication via internet (CCBusinessReview, 2013). A number of other new 'smart hubs' apparently are also intended to be introduced in the Central Coast (TCC, 2013).

A similar interest is emerging in South East Queensland for creating new 'digital work hubs'. Five Regional Development Australia committees (Sunshine Coast, Logan and Redlands, Gold Coast, Moreton Bay and Brisbane) are researching the possibility of creating collaborative workspaces across five RDA regions. This is justified by considering that "with almost 191,000 workers commuting to Brisbane daily from the Sunshine Coast, Moreton Bay, Ipswich, Logan, Redland and Gold Coast regions it's crucial to develop flexible work practices and opportunities to minimise the impact on workers' health, wellbeing and productivity" (RDA, 2013).

Co-working environments have also had significant growth in Australia in recent years. A co-working environment is a space where independent professionals (such as designers, developers, marketers, etc.) can work independently or collaboratively in a shared office space (Sparovic, 2012). It is facilitated by high qualified internet access, conference rooms, breakout areas and other office necessities (Sparovic, 2012).

New teleworking hubs can be co-located with different innovative work practices such as co-working, office space for startups and small business services, and social enterprise innovations. Home-based teleworking also plays an important role in this ecosystem of flexible working. Live/work communities in Australia are the good examples of this co-location. Alizadeh (2012) has discussed an example of this type of development in South East Queensland that has been established by private developers. This development includes different types of teleworking environment: home-office (integrated, semi-separated, and completely separated) and community based offices. Community based offices come in two forms the co-workplace (shared office space and shared office facilities) for independent workers, and office buildings (Including satellite corporate office and independent office space) which are used by major companies such as IBM Australia, MaxSoft Group, On the Net, go talk, and Conics (Alizadeh, 2012).

Australian planning policies for teleworking are facilitative overall. Local controls usually allow teleworking as a home activity. There has been less policy attention given to promote non-home teleworking environments, with exceptions such as those listed above. Given the sustainability advantages of teleworking in terms of reducing fossil fuel-based travel, there is a strong case for requiring developers of new residential precincts to plan for, or contribute to, telework facilities such as those described in SEQ. In theory, the size of such contributions could be made equal to the transport infrastructure and operating costs saved by the telework generated. But as this paper has demonstrated, an existing lack of knowledge as to preferred telework environments means that such policies risk investing resources in sub-optimal facilities.

Planning for telework telecommunications infrastructure has been at the national level because this is a Commonwealth responsibility under the constitution. While the spatial structure of the NBN network is at present uncertain following the advent of the new Liberal-National Australian government in September 2013, several observations here might be made. Firstly, new residential developments of over 100 dwellings have priority for NBN connection, with developers required to install appropriate pit and pipe infrastructure to facilitate NBN connection. This helps to address the need for telework opportunities to be maximized in areas furthest from employment concentrations. Second, the new government's announced policy for standard NBN connections from local nodes to residences to be via copper wire means that areas where telecom traffic is high enough to warrant fibre optic cabling form node to residences will have much greater broadband capacity than other areas and thus much better opportunities for competitive telework. Thus, perversely, the areas where telework will be most competitive with standard workplaces will be existing major office precincts and high density

residential zones, as well as other areas already with fibre to premises such as high tech suburban office parks and areas connected to the NBN before the change in NBN policy by the new Australian government. Such market-led outcomes will not prioritise the more distant suburbs most needing high quality broadband for competitive teleworking.

The major implications of teleworking for planning at the state and local level lie at the strategic level. One issue here is uncertainty about the timing of NBN connections to individual areas. This information should, in theory, feed into forecasts of local activity using high broadband width and into traffic forecasts. More generally, strategic plans need to forecast future levels and types of teleworking in order to adjust traffic projections and estimates of future travel in general, and use this to adjust transport infrastructure plans and employment area provision. However, as this paper has argued, without better understanding of motivations and preferences for different types of, and locales for, telework, such forecasting will not have an adequate frame of reference. Moreover, there is the wider context of the extent to which improved broadband access to outer suburbs and regions will offset contemporary trends for the spatial concentration and centralization of knowledge-intensive activities. Planning for future teleworking thus epitomizes the general strategic planning problem of how uncertain future impacts of technology should be taken into account.

6- CONCLUSION

This paper has highlighted the emerging variety in Australian teleworking environments. The 2007-2013 Australian Federal Government aimed to double the rate of teleworking by 2020, with the number of employees who have the teleworking arrangements with their employer increasing to at least 12 per cent of the Australian workforce (DBCDE, 2011). The commitment of the new Australian government to continuing National Broadband Network roll-out, embodying a significant increase in fibre optic cable connectivity, supports the potential for further innovation in creating new teleworking environments in the near future. This leads to the need to take account of the differences between different teleworking environments in supporting different needs of teleworkers.

This paper has shown that research on the adoption of teleworking needs to consider the psycho-social differences between different teleworking environments. Teleworkers normally choose their preferred teleworking environment according to opportunities these environments provide in making a balance between life and work, but teleworking environments can also be different regarding the satisfaction of other psycho-social needs. In general, the paper highlights a gap in literature regarding the degree of teleworkers' motivation in different teleworking environments. Here, we suggest the application of different psychological theories of motivation to understand differences between different teleworking environments, as previous studies have mostly neglected the role of these theories.

We also argue that an understanding of teleworker motivations toward different types of teleworking is critical for understanding the extent to which each different telework environment will be preferred and therefore supported by planning policies to promote sustainability. Different forms of teleworking will have very different impacts on urban structure and transport provision, and different implications for each of economic, social and environmental sustainability. At present, planners have very limited understanding of the likely future spatial structure of teleworking across Australia. This paper has attempted to identify areas where research might most profitably be directed to help address this lack of knowledge.

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